permitted by other applicable law, the penalty expires on or before December 31, 2011, and the penalty will not apply if the source of the prepayment funds is a refinancing by the creditor or its affiliate.

ii. Initial payments for a variable-rate transaction consummated on January 1, 2010 are $1,000 per month and the loan agreement permits negative amortization to occur. Under the loan agreement, the first date that a scheduled payment in a different amount may be due is January 1, 2014, but the creditor has the right to change scheduled payments prior to that date if negative amortization occurs. A prepayment penalty is prohibited with this mortgage transaction because the payment may change within the four-year period following consummation.

Dated: May 16, 2013.

Richard Cordray,

Director, Bureau of Consumer Financial Protection.

[FR Doc. 2013–12125 Filed 5–22–13; 8:45 am]

BILLING CODE 4810–AM–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

18 CFR Part 40

[Docket No. RM12–22–000; Order No. 779]

Reliability Standards for Geomagnetic Disturbances

AGENCY: Federal Energy Regulatory Commission.

ACTION: Final rule.

SUMMARY: Under section 215 of the Federal Power Act, the Federal Energy Regulatory Commission (Commission) directs the North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization, to submit to the Commission for approval proposed Reliability Standards that address the impact of geomagnetic disturbances (GMD) on the reliable operation of the Bulk-Power System. The Commission directs NERC to implement the directive in two stages. In the first stage, NERC must submit, within six months of the effective date of this Final Rule, one or more Reliability Standards that require owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System. In the second stage, NERC must submit, within 18 months of the effective date of this Final Rule, one or more Reliability Standards that require owners and operators of the Bulk-Power System to conduct initial and on-going assessments of the potential impact of benchmark GMD events on Bulk-Power System equipment and the Bulk-Power System as a whole. The Second Stage GMD Reliability Standards must identify benchmark GMD events that specify what severity GMD events a responsible entity must assess for potential impacts on the Bulk-Power System. If the assessments identify potential impacts from benchmark GMD events, the Reliability Standards should require owners and operators to develop and implement a plan to protect against instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, as a result of a benchmark GMD event. The development of this plan cannot be limited to considering operational procedures or enhanced training alone, but will, subject to the potential impacts of the benchmark GMD events identified in the assessments, contain strategies for protecting against the potential impact of GMDs based on factors such as the age, condition, technical specifications, system configuration, or location of specific equipment. These strategies could, for example, include automatically blocking geomagnetically induced currents from entering the Bulk-Power System, instituting specification requirements for new equipment, inventory management, isolating certain equipment that is not cost effective to retrofit, or a combination thereof.

DATES: This rule will become effective July 22, 2013.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION:

143 FERC ¶ 61,147

United States of America

Federal Energy Regulatory Commission

Before Commissioners:

Jon Wellinghoff, Chairman;

Philip D. Moeller, John R. Norris, Cheryl A. LaFleur, and Tony Clark.

Final Rule

Issued May 16, 2013.

1. Pursuant to section 215(d)(5) of the Federal Power Act (FPA),[1] the Commission directs the North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization (ERO), to submit for approval Reliability Standards (GMD Reliability Standards) that address the risks posed by geomagnetic disturbances (GMD) to the reliable operation of the Bulk-Power System.

2. The Commission directs NERC to implement the directive in two stages. In the first stage, NERC must submit, within six months of the effective date of this Final Rule, one or more Reliability Standards that require owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System. In the second stage, NERC must submit, within 18 months of the effective date of this Final Rule, one or more Reliability Standards that require owners and operators of the Bulk-Power System to conduct initial and on-going assessments of the potential impact of benchmark GMD events on Bulk-Power System equipment and the Bulk-Power System as a whole. The Second Stage GMD Reliability Standards must identify ''benchmark GMD events'' that specify what severity GMD events a responsible entity must assess for potential impacts on the Bulk-Power System. The benchmark GMD events must be technically justified because the benchmark GMD events will define the scope of the Second Stage GMD Reliability Standards (i.e., responsible entities should not be required to assess GMD events more severe than the benchmark GMD events). If the assessments identify potential impacts from benchmark GMD events, the Reliability Standards should require owners and operators to develop and implement a plan to protect against instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, as a result of a benchmark GMD event. The plan cannot be limited to considering operational procedures or enhanced training alone. Rather, the plan must, subject to the potential impacts of the benchmark GMD events identified in the assessments, contain strategies for protecting against the potential impact

[1] 16 U.S.C. 824o(d)(5) (2006).

of GMDs based on factors such as the age, condition, technical specifications, system configuration, or location of specific equipment. These strategies could, for example, include automatically blocking geomagnetically induced currents (GICs) from entering the Bulk-Power System, instituting specification requirements for new equipment, inventory management, isolating certain equipment that is not cost effective to retrofit, or a combination thereof. The Reliability Standards should include Requirements whose goal is to prevent instability, uncontrolled separation, or cascading failures of the Bulk-Power System when confronted with a benchmark GMD event. Given that the scientific understanding of GMDs is still evolving, we recognize that Reliability Standards cannot be expected to protect against all GMD-induced outages.

3. We take this action based on the potentially severe, wide-spread impact on the reliable operation of the Bulk-Power System that can be caused by GMD events and the absence of existing Reliability Standards to address GMD events. We are not directing the ERO to include any specific Requirements in the GMD Reliability Standards nor are we pre-judging what the ERO eventually submits for approval. Instead, in this Final Rule, we identify issues that should be considered in the NERC standards development process. We expect NERC to explain how the proposed GMD Reliability Standards address these issues when the Reliability Standards are submitted for Commission approval.

I. Background

A. Section 215 and Mandatory Reliability Standards

4. Section 215 of the FPA requires the Commission to certify an ERO to develop mandatory and enforceable Reliability Standards, subject to Commission review and approval.[2] Once approved, the Reliability Standards may be enforced in the United States by the ERO, subject to Commission oversight, or by the Commission independently.

5. Pursuant to FPA section 215(d)(5), the Commission has the authority, upon its own motion or upon complaint, to order the ERO to submit to the Commission a proposed Reliability Standard or a modification to a Reliability Standard that addresses a specific matter if the Commission considers such a new or modified Reliability Standard appropriate to carry out section 215 of the FPA.[3]

B. Geomagnetic Disturbances

6. A GMD, caused by solar events, results in distortions to the earth's magnetic field, can be of varying intensity, and has in the past impacted the operation of pipelines, communications systems, and electric power systems.[4] The interaction of the earth's magnetic field and solar events can cause low frequency GICs to flow along the surface of the earth and in the oceans. Reliability issues arise when GICs enter the Bulk-Power System from the earth. Because many Bulk-Power System transformers are grounded, the GIC appears as electrical current to the Bulk-Power System and flows through the ground connection and conductors, such as transformers and transmission lines.[5] GICs can cause ''half-cycle saturation'' of high-voltage Bulk-Power System transformers, which can lead to increased consumption of reactive power and creation of disruptive harmonics that can cause the sudden collapse of the Bulk-Power System.[6] Further, half-cycle saturation from GICs can potentially damage Bulk-Power System transformers because of overheating.[7]

C. Studies of GMD Events on the Bulk-Power System

7. The impact of GMDs on the Bulk-Power System has been evaluated in several government-sponsored studies and NERC reports. The EMP Commission issued reports assessing the threat to the United States from Electromagnetic Pulse (EMP) attack in 2004 and 2008, which also addressed the effects of geomagnetic storms on the electric power infrastructure.[8] The National Research Council of the National Academies issued a report addressing the impact of severe space weather events in 2008.[9] The Oak Ridge National Laboratory issued a series of reports on the effects of electromagnetic pulses on the Bulk-Power System in January 2010.[10] NERC issued the HILF Report on high-impact, low-frequency risks to the Bulk-Power System in June 2010.[11]

8. In November 2010, NERC endorsed the creation of a GMD Task Force to ''develop a technical white paper describing the evaluation of scenarios of potential GMD impacts, identifying key bulk power system parameters under those scenario conditions, and evaluating potential reliability implications of these incidents.'' [12] The NERC GMD Task Force was formed in early 2011.[13] In February 2012, the NERC GMD Task Force issued the NERC Interim GMD Report evaluating the effects of GMDs on the Bulk-Power System.

9. The Commission held a Technical Conference on April 30, 2012 to discuss the risks posed by GMDs to the reliable operation of the Bulk-Power System.[14] Several panelists indicated at the Technical Conference that severe GMD events could potentially compromise the reliable operation of the Bulk-Power System, with some noting as an example the GMD-induced disruption of the Hydro-Québec grid in 1989.[15] Some

[2] 16 U.S.C. 824o (2006).

[3] 16 U.S.C. 824o(d)(5); 18 CFR 39.5(f) (2012).

[4] Oak Ridge National Laboratory, Electric Utility Industry Experience with Geomagnetic Disturbances at xiii (1991), available at *http://www.ornl.gov/~webworks/cpr/v823/rpt/51089.pdf.*

[5] North American Electric Reliability Corp., *2012 Special Reliability Assessment Interim Report: Effects of Geomagnetic Disturbances on the Bulk Power System* at ii (February 2012) (*NERC Interim GMD Report*), available at *http://www.nerc.com/files/2012GMD.pdf.*

[6] *Id.* at iii–iv.

[7] *Id.*

[8] These reports are accessible at the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack Web site at *http://www.empcommission.org/.*

[9] National Research Council of the National Academies, Severe Space Weather Events—Understanding Societal and Economic Impacts: A Workshop Report at 4 (2008) (NAS Workshop Report), available at *http://www.nap.edu/catalog/12507.html.*

[10] Oak Ridge National Laboratory, *FERC EMP–GIC Metatech Reports 319–324* (January 2010) (collectively, *Oak Ridge Study*), available at *http://www.ornl.gov/sci/ees/etsd/pes/ferc_emp_gic.shtml.*

[11] The HILF Report was prepared by NERC, Department of Energy, and a steering committee comprised of industry and risk experts and was approved by the NERC Board of Trustees on May 17, 2010. North American Electric Reliability Corp., *High-Impact, Low-Frequency Event Risk to the North American Bulk Power System,* at 2 (June 2010) (HILF Report), available at *http://www.nerc.com/files/HILF.pdf.*

[12] NERC, Board of Trustees Minutes, Exhibit J, at 1 (Nov. 4, 2010), available at *http://www.nerc.com/docs/docs/bot/BOT-1110m-open-complete.pdf.*

[13] NERC Comments at 2 n.4.

[14] Written statements presented at the Technical Conference, post-Technical Conference comments, and Technical Conference transcript are accessible through the Commission's eLibrary document retrieval system in Docket No. AD12–13–000.

[15] NOPR, 141 FERC ¶ 61,045 at P 3 (citing Statement of Scott Pugh, U.S. Department of Homeland Security at 2 (citing 1989 Hydro-Québec blackout); Statement of Frank Koza, PJM Interconnection, L.L.C. at 1 (''The combination of half-cycle transformer saturation and increased reactive power consumption can lead to voltage collapse and blackouts if not properly managed.''); Statement of John Kappenman at 8 (''The bulk power system is the nation's most important critical infrastructure and unlike other threats, a severe geomagnetic storms [sic] can impose a near simultaneous nationwide crippling threat to this vital infrastructure.''); Statement of Gerry Cauley, NERC at 1 (''Previous examples, such as the 1989 event in Hydro Québec demonstrate that severe solar storms represent a serious risk that can challenge the reliability of the bulk power system.'')).

commenters, however, expressed concern with developing Reliability Standards to address GMD events at this time.[16]

D. Notice of Proposed Rulemaking

10. On October 18, 2012, the Commission issued a Notice of Proposed Rulemaking (NOPR) pursuant to FPA section 215(d) proposing to direct that NERC submit to the Commission for approval proposed Reliability Standards that address the risks posed by GMDs to the reliable operation of the Bulk-Power System.[17] The NOPR stated that the proposal was based on government-sponsored studies and NERC studies indicating that GMD events can have an adverse, wide-area impact on the reliable operation of the Bulk-Power System.[18] The NOPR stated that GMD vulnerabilities are not adequately addressed in the Reliability Standards and that this constitutes a reliability gap because GMD events can cause the Bulk-Power System to collapse suddenly and can potentially damage equipment on the Bulk-Power System.

11. The NOPR proposed to direct NERC to develop GMD Reliability Standards in two stages. Regarding the first stage, NERC would submit one or more proposed Reliability Standards that require owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System. The NOPR proposed that NERC would submit these First Stage GMD Reliability Standards within 90 days of the effective date of a final rule in this proceeding. The NOPR, while not proposing to direct a specific implementation plan, encouraged a 90-day implementation period following Commission approval of the First Stage GMD Reliability Standards.

12. The NOPR proposed to accept aspects of the ''Initial Actions'' plan set forth in NERC's May 21, 2012 post-Technical Conference comments, in which NERC stated that it would ''identify facilities most at-risk from severe geomagnetic disturbance'' and ''conduct wide-area geomagnetic disturbance vulnerability assessment.'' [19] In the NOPR, the Commission stated that it agreed with NERC that critical Bulk-Power System facilities should be evaluated for GMD vulnerability and, as part of the ''Initial Actions,'' special attention should be given to Bulk-Power System facilities that provide service to critical and priority loads. The NOPR proposed that NERC would conduct these ''Initial Actions'' simultaneously with the development of the First Stage GMD Reliability Standards.

13. Regarding the second stage, the NOPR proposed that, within six months of the effective date of a final rule in this proceeding, NERC would file one or more proposed Reliability Standards that require owners and operators of the Bulk-Power System to conduct initial and on-going assessments of the potential impact of GMDs on Bulk-Power System equipment and the Bulk-Power System as a whole. The NOPR stated that, based on those assessments, the Reliability Standards would require owners and operators to develop and implement a plan so that instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, will not occur as a result of a GMD. The NOPR stated that the plan could not be limited to operational procedures or enhanced training alone, but should, subject to the needs identified in the assessments, contain strategies for protecting against the potential impact of GMDs based on factors such as the age, condition, technical specifications, or location of specific equipment. The NOPR further stated that these strategies could include automatically blocking GICs from entering the Bulk-Power System, instituting specification requirements for new equipment, inventory management, and isolating certain equipment that is not cost effective to retrofit. Without proposing a specific implementation period, the NOPR stated that the Second Stage GMD Reliability Standards would likely need to be implemented in phases, focusing first on the most critical Bulk-Power System assets.

14. In response to the NOPR, interested entities filed 62 comments. We address below the issues raised in the comments.[20] The Appendix to this Final Rule lists the entities that filed comments to the NOPR.[21]

II. Discussion

15. As discussed below, the Commission finds that the existing Reliability Standards do not adequately address the risks posed by GMDs to the reliable operation of the Bulk-Power System. In its NOPR comments, NERC states that ''[a]s a high-impact, low-frequency event, GMDs pose a unique threat to Bulk-Power System reliability, and NERC is committed to working with stakeholders and the Commission to address these challenges consistent with its responsibilities as the ERO.'' [22] Accordingly, pursuant to section 215(d)(5) of the FPA, the Commission directs the ERO to develop and submit for approval Reliability Standards that address the potentially severe, widespread impact of GMD events on the reliable operation of the Bulk-Power System.[23]

16. We issue this directive recognizing, as we did in the NOPR, that there is an ongoing debate as to the likely effect of GMDs on the reliable operation of the Bulk-Power System. As discussed below, the NOPR comments reflect these differing views, with some comments supporting the NERC Interim GMD Report's conclusion that the worst-case GMD scenario is ''voltage instability and subsequent voltage collapse,'' [24] while other comments endorse the Oak Ridge Study's conclusion that a severe GMD event could put Bulk-Power System transformers at risk for failure or permanent damage.[25] As we stated in the NOPR, and affirm here, ''[w]hile the conclusions of these reports differ significantly, our proposed action is warranted by even the lesser

[16] *See, e.g.,* Statement of Steven Naumann, EEI at 5 (''Until [system-wide] studies are completed, it is premature to determine whether NERC should advance development of mandatory requirements to address GMD related-issues.'').

[17] *Reliability Standards for Geomagnetic Disturbances,* Notice of Proposed Rulemaking, 77 FR 64,935 (Oct. 24, 2012), 141 FERC ¶ 61,045 (2012) (NOPR).

[18] NOPR, 141 FERC ¶ 61,045 at P 2 (citing *NERC Interim GMD Report* at 85; *HILF Report* at 68; *Oak Ridge Study*).

[19] NERC May 21, 2012 Comments at 8–9.

[20] Some comments raised issues not addressed in the NOPR, including cost recovery for compliance with the GMD Reliability Standards; the risks posed to the Bulk-Power System by electromagnetic pulses; the organization and conduct of the NERC GMD Task Force; terrorism; and cybersecurity. Issues outside the scope of the NOPR are not addressed in this Final Rule. However, nothing precludes entities from seeking cost recovery if needed.

[21] A document submitted by the Nuclear Regulatory Commission (NRC) was erroneously included in the Commission's eLibrary system in this rulemaking docket and was subsequently removed. The NRC document did not influence the determinations in this Final Rule.

[22] NERC Comments at 3.

[23] We do not necessarily require NERC to develop and submit entirely new Reliability Standards. NERC could develop and submit revisions to existing Reliability Standards. In addition, as stated in the NOPR, facilities and equipment falling outside of our jurisdiction would not be subject to the proposed GMD Reliability Standards. NOPR, 141 FERC ¶ 61,045 at P 27 n.49.

[24] NERC Interim GMD Report at 69.

[25] Oak Ridge National Laboratory, *Electromagnetic Pulse: Effects on the U.S. Power Grid: Meta–R–319* at page 1–14, Tables 4–1, 4–2, 4–3 (discussing at-risk transformers) (January 2010) (*Oak Ridge Study 319 Report*), *available at http://www.ornl.gov/sci/ees/etsd/pes/pubs/ferc_Meta-R-319.pdf.*

consequence of a projected widespread blackout without long-term, significant damage to the Bulk-Power System. Taking steps to prevent such blackouts is consistent with maintaining the reliable operation of the Bulk-Power System.'' [26]

17. In directing the ERO to submit Reliability Standards that address the potential impact of GMD events on the reliable operation of the Bulk-Power System, we are not directing NERC to include specific Requirements or otherwise pre-judging what the ERO eventually proposes. In addition, we are not directing the ERO to develop GMD Reliability Standards that are ''one-size-fits-all,'' a concern expressed in the comments.[27] Instead, in this final rule we identify issues that should be considered in the NERC standards development process. We expect NERC to develop GMD Reliability Standards that address these issues and, when these Reliability Standards are submitted to the Commission for approval, to explain in the accompanying petition how the issues are addressed in the proposed GMD Reliability Standards.[28]

18. Because of concerns raised in the comments regarding the proposed schedule for developing and submitting the GMD Reliability Standards, we adjust the schedule in the NOPR to allow more time. Accordingly, we set a six-month deadline from the effective date of this Final Rule for NERC to submit the First Stage GMD Reliability Standards and suggest a six-month implementation period for the First Stage GMD Reliability Standards following Commission approval. We set an 18-month deadline from the effective date of this Final Rule for NERC to submit the Second Stage GMD Reliability Standards, and direct NERC to propose an implementation period.

19. Below we address the comments regarding: (1) The Commission's authority to direct the ERO to develop and submit GMD Reliability Standards under FPA section 215(d)(5); (2) the content of the First Stage GMD Reliability Standards and the schedule for submitting and implementing the Reliability Standards; (3) the ''Initial Actions'' GMD vulnerability assessments; and (4) the content of the Second Stage GMD Reliability Standards and the schedule for submitting and implementing those Reliability Standards.

A. Commission Authority To Direct the ERO To Develop GMD Reliability Standards Under FPA Section 215(d)(5) NOPR

20. The NOPR stated that GMD vulnerabilities are not adequately addressed in the existing Reliability Standards.[29] The NOPR stated that this constitutes a reliability gap because GMD events can cause the Bulk-Power System to collapse suddenly and can potentially damage the Bulk-Power System.[30] In order to carry out section 215 of the FPA, the NOPR proposed to direct NERC to develop and submit for approval Reliability Standards that address the potentially severe, wide-spread impact of GMD events on the reliable operation of the Bulk-Power System.

Comments

21. NERC states that it ''supports the Commission's exercise of its authority pursuant to Section 215(d)(5) in the NOPR and the due weight given to NERC's technical expertise with respect to the content of the proposed Reliability Standards. The NOPR explicitly does not propose to require NERC or owners or operators of the Bulk-Power System to adopt any particular operational procedures or a particular solution in the second stage Reliability Standards to address GMDs. NERC submits that this approach is consistent with Section 215(d)(2) of the Federal Power Act.'' [31]

22. ELCON states that the NOPR does not establish why the GMD Reliability Standards are ''appropriate to carry out [section 215],'' as required under FPA section 215(d)(5).[32] ELCON states that the ''NOPR does not give sufficient recognition to the key unresolved technical issues, including the lack of consensus about the nature and potential impacts of GMD events and the absence of tools for modeling or addressing the effects of geomagnetic induced currents.'' [33] Accordingly, ELCON states that ''a final rule would not be supportable as an exercise of the Commission's authority under Section 215(d)(5).'' [34] The Trade Associations state that ''[w]hile FERC has authority under Section 215(d)(5) to direct the ERO to develop a mandatory standard on a specific matter, the specific matter that is the subject of this NOPR, GIC levels caused by strong GMD events, does not have a strong scientific or technical consensus upon which to develop standards.'' [35] NARUC states that the NOPR ''does not provide sufficient cost benefit or technical evidence to justify a directive to NERC to set GMD Reliability Standards at this time.'' [36] Other commenters, without explicitly addressing the Commission's authority to direct the ERO to develop GMD Reliability Standards, state that there is an insufficient technical basis for the NERC standards development process.[37]

Commission Determination

23. The Commission finds that the directives in this Final Rule are a valid exercise of the Commission's authority under FPA section 215(d)(5). The plain language of the statute authorizes the Commission to order the development of a Reliability Standard that ''addresses a specific matter if the Commission considers such a new or modified reliability standard appropriate to carry out this section.'' [38]

24. We determine that addressing the specific matter of GMDs and their impact on the reliable operation of the Bulk-Power System is appropriate to carry out FPA section 215. As the NOPR stated, while there is an ongoing debate as to how a severe GMD event will most likely impact the Bulk-Power System, there is a general consensus that GMD events can cause wide-spread blackouts due to voltage instability and subsequent voltage collapse, thus disrupting the reliable operation of the Bulk-Power System.[39]

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[26] NOPR, 141 FERC ¶ 61,045 at P 5 (citing 16 U.S.C. 824o(a)(4)).

[27] *See, e.g.,* NERC Comments at 4; EIS Comments at 3; Bonneville Comments at 3; NV Energy Comments at 4. Rather than adopt a ''one-size-fits-all'' approach, the NOPR stated that the Oak Ridge Study identified several variables that determine the severity of GMD events, including: (1) Location and strength of the underlying solar event; (2) ground conductivity in the affected locations (i.e., the geology of the location); (3) orientation of the transmission lines; (4) length of transmission lines; and (5) grid construction. NOPR at P 14 (citing *Oak Ridge Study 319 Report* at page 2–5).

[28] In its comments, NERC encourages the Commission to permit Commission staff to actively participate in the NERC standards development process. NERC Comments at 8. Consistent with the Commission's current practice, Commission staff will participate as an observer in the development of the GMD Reliability Standards.

[29] NOPR, 141 FERC ¶ 61,045 at P 4 (citing NERC Reliability Standard IRO–005–3a (Reliability Coordination—Current Day Operations), Requirement R3, as the only existing Requirement that discusses GMDs).

[30] NOPR, 141 FERC ¶ 61,045 at PP 4–5.

[31] NERC Comments at 7.

[32] 16 U.S.C. 824o(d)(5) (''The Commission, upon its own motion or complaint may order the Electric Reliability Organization to submit to the Commission a proposed reliability standard or a modification to a reliability standard that addresses a specific matter if the Commission considers such a new or modified reliability standard appropriate to carry out this section.'').

[33] ELCON Comments at 4–5.

[34] *Id.* at 5.

[35] Trade Associations Comments at 25.

[36] NARUC Comments at 3.

[37] *See, e.g.,* Duke Comments at 2–4; CenterPoint Comments at 3.

[38] 16 U.S.C. 824o(d)(5).

[39] *See, e.g.,* Trade Associations Comments at 51 (''The 1989 Hydro Quebec Blackout, is often used in the ORNL/Metatech Report to assert that wide

25. FPA section 215 defines ''reliability standard'' as a ''requirement . . . to provide for reliable operation of the bulk-power system.'' [40] FPA section 215 defines ''reliable operation'' to mean ''operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.'' [41] Because there is a general consensus that GMD events can cause ''voltage instability and subsequent voltage collapse,'' thus affecting the reliable operation of the Bulk-Power System, the Commission finds that GMDs are valid subject matter for Reliability Standards development. In addition, as the Trade Associations' comments acknowledge, the Reliability Standards currently do not expressly require responsible entities to mitigate the risks posed by GMDs to the Bulk-Power System.[42] Therefore, we believe that it is appropriate to direct NERC to submit new or modified Reliability Standards that address GMDs pursuant to FPA section 215(d)(5).

26. We reject the assertion that a lack of technical or scientific consensus regarding some issues associated with GMDs deprives the Commission of the statutory authority to order the development of revised or new Reliability Standards. While the Commission must have a reasonable basis for its actions, section 215(d)(5) does not require the Commission to certify the existence of a consensus before it can require the ERO to develop a Reliability Standard. Instead, the statute specifically vests the Commission with the discretion to determine when a new Reliability Standard is necessary.[43] In any event, the lack of consensus in this case pertains to the most likely impact of a severe GMD event and the appropriate measures to take in mitigation. There is general agreement that GMD events can cause wide-spread blackouts due to voltage instability and subsequent voltage collapse, thus disrupting the reliable operation of the Bulk-Power System.[44] In fact, such blackouts have occurred.[45] Requiring Reliability Standards to protect against these risks is well within the Commission's authority. Moreover, the NERC standards development process will be the vehicle for working through the technical complexities associated with addressing the risks of GMD events on the Bulk-Power System.[46] This is consistent with the NERC Standards Process Manual, which states that the NERC standards development process is designed to ''build and document consensus for each Reliability Standard, both with regard to the need and justification for the Reliability Standard and the content of the Reliability Standard.'' [47]

27. Some comments contend that the NOPR proposed to direct NERC to develop GMD Reliability Standards containing overly prescriptive Requirements in too short an amount of time.[48] Moreover, those comments state that the NOPR relied on underlying studies that, the comments assert, are flawed or unreliable.[49] However, as NERC recognizes in its NOPR comments, the NOPR explicitly stated that it was not directing the ERO to include any specific Requirements or otherwise pre-judging what the ERO eventually submits for approval.[50] In this Final Rule, we direct the ERO to consider issues in the NERC standards development process, but we do not direct the content of the Reliability Standards or pre-judge what NERC ultimately proposes. As for the timing of the submission and implementation of the GMD Reliability Standards, we address that concern by modifying the schedule in the NOPR to give NERC more time to develop and submit the Reliability Standards. With respect to the commenters' criticism of the studies cited in the NOPR, we recognize the divergent views.[51] However, as stated above, our directive to develop GMD Reliability Standards is justified even under the conclusion in the NERC GMD Interim Report, with which the Trade Associations ''strongly agree,'' that a GMD event could result in ''voltage instability and subsequent voltage collapse.'' [52]

28. Finally, while we disagree that FPA section 215(d)(5) (the specific subsection we rely on in this proceeding) requires a particular cost-benefit showing in order to direct the development of revised or new Reliability Standards, the Commission is cognizant of the potential costs of GMD Reliability Standards. As we explain and clarify in this final rule, the Commission is not directing the content of the GMD Reliability Standards that must be submitted, and with respect to the Second Stage GMD Reliability Standards, is not mandating the use of any particular technologies (such as automatic blocking) to address the potential impact of benchmark GMD events. We expect that NERC and industry will consider the costs and benefits of particular mitigation measures as NERC develops the

spread collapse and permanent equipment damage is a likely outcome of a severe GMD event. Although the Trade Associations agree that both are potential risks of a severe GMD event, the Trade Association find the conclusions of the GMD Task Force, which states that 'the most likely worst-case system impacts from a severe GMD event and corresponding GIC flow is voltage instability caused by a significant loss of reactive power support,' to be more credible and based on the scientific facts.''); PJM Comments at 3 (''[T]here is no question that severe space weather has the potential to create serious problems for the Bulk-Power System.''); ITC Comments at 2 (''ITC believes that the risk to the bulk power system from GMD is a significant concern that should be addressed.'').

[40] 16 U.S.C. 824o(a)(3).

[41] *Id.* at 824o(a)(4).

[42] Trade Associations Comments at 25 (''[T]he Trade Associations acknowledge that NERC Reliability Standards do not expressly require steps for mitigating the effects of GMD events.'').

[43] 16 U.S.C. 824o(d)(5); *see also Transmission Relay Loadability Reliability Standard,* 134 FERC ¶ 61,127, at P 25 (2011) (explaining that under section 215(d)(5) ''the Commission, and not just the ERO, has the responsibility and authority to identify 'specific matters' that it considers appropriate to carry out section 215. Section 215 establishes a paradigm by which both the Commission and the ERO are responsible for identifying reliability gaps—the ERO through its Reliability Standards development process, where it can independently identify areas of concern and develop Standards to address them; and the Commission through its review of proposed Reliability Standards and authority to direct modifications or new Standards that address specific issues necessary to effectuate the purposes of section 215.'').

[44] *See supra* n.39.

[45] *See* NERC Interim GMD Report at i (citing 1989 Hydro-Québec blackout).

[46] The NERC GMD Task Force has already developed operational procedure templates for certain functional entities. *See* NERC GMD Task Force Geomagnetic Disturbance Operating Procedure Template: Transmission Operator, *available at http://www.nerc.com/docs/pc/gmdtf/Template_TOP.pdf;* NERC GMD Task Force Geomagnetic Disturbance Operating Procedure Template: Generator Operator, *available at http://www.nerc.com/docs/pc/gmdtf/Template_GOP.pdf.* We expect that the NERC standards development process will consider the NERC GMD Task Force's work as a resource.

[47] NERC Rules of Procedure, Appendix 3A (Standards Process Manual) (Effective January 31, 2012) at 4.

[48] *See, e.g.,* ELCON Comments at 7–14; CenterPoint Comments at 2.

[49] *See, e.g.,* Trade Associations Comments at 19.

[50] NOPR, 141 FERC ¶ 61,045 at P 17.

[51] While some commenters criticize the Oak Ridge Study's conclusions regarding the possible damaging effects of GMDs to Bulk-Power System components, the NOPR stated that the NERC-approved HILF Report also found that ''[t]ransformers experience excessive levels of internal heating brought on by stray flux when GICs cause the transformer's magnetic core to saturate, forcing magnetic flux to flow outside the normal core steel magnetic circuit. Previous well documented cases have noted heating failures that caused melting and burn-through of large-amperage copper windings and leads in these transformers (Figure 9).'' NOPR, 141 FERC ¶ 61,045 at 13 n.33 (citing *HILF Report* at 70).

[52] NERC Interim GMD Report at 69; Trade Associations Comments at 17–18.

technically-justified Second Stage GMD Reliability Standards.

B. First Stage GMD Reliability Standards

29. As discussed below, the Commission directs that, within six months of the effective date of this Final Rule, NERC submit for approval one or more Reliability Standards that require owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System. We address below the comments regarding the content of the First Stage GMD Reliability Standards and the schedule for submitting and implementing the First Stage GMD Reliability Standards.

1. Content of First Stage GMD Reliability Standards NOPR

30. The NOPR proposed to direct NERC to submit one or more Reliability Standards requiring owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System. The NOPR stated that the proposed Reliability Standards should not necessarily specify what operational procedures must be adopted, but the ERO should give owners and operators of the Bulk-Power System guidance as to what procedures have been or are expected to be effective in mitigating the effects of GMDs consistent with the reliable operation of the Bulk-Power System. The NOPR also stated that the proposed Reliability Standards should address the coordination of operational procedures among responsible entities across regions. The NOPR further stated that, because there is potential for equipment damage resulting from a GMD event, the proposed Reliability Standards should also address operational procedures for restoring GMD-impacted portions of the Bulk-Power System that take into account the potential for equipment that is damaged or out-of-service for an extended period of time. The NOPR also proposed that, following implementation, NERC would provide periodic reports assessing the effectiveness of operational procedures in mitigating the effects of GMD events and periodically review the required operational procedures and recommend to owners and operators that they incorporate lessons-learned and new research findings.

Comments

31. NERC and several commenters generally support the development of Reliability Standards requiring owners and operators to develop and implement operational procedures to address GMDs.[53] Some commenters state that certain entities have already implemented operational procedures to address GMDs, and some commenters stress the importance of combining operational procedures with monitoring and situational awareness.[54] Other commenters express concern with relying on operational procedures alone to address GMDs.[55]

32. NERC states that it supports the development of operational procedures because ''[t]raining and education programs on the nature of the threat [of GMDs] will allow Bulk-Power System Operators to more rapidly identify areas for improvement and take actions when necessary.'' [56] NERC states, however, that its ability to assess and report on the effectiveness of operational procedures is constrained because of the limitations with monitoring and forecasting GMD events. NERC states that, if the Commission requires NERC to submit periodic reports, as proposed in the NOPR, the reports should be submitted no more frequently than annually and, in part to conserve ERO resources, that the reporting obligation should expire upon implementation of the Second Stage GMD Reliability Standards. NERC also states that the emergence of new forecasting capabilities is vital to improving early warning and understanding of potential GMD effects and will directly impact the development of operational procedures. NERC states that relying on the ''K-Index,'' [57] which NERC describes as the most familiar means of characterizing the severity of geomagnetic storms, is problematic because of the associated ''uncertainties and inaccuracies.'' NERC states that the K-Index ''cannot be used as an automatic triggering event for specific required actions because operational procedures need flexibility to account for actual operating conditions and the ability to adjust accordingly.'' [58]

33. Commenters that oppose Reliability Standards requiring the development and implementation of operational procedures state that Reliability Standards are premature because the science of GMDs is not fully understood and more study is needed before Reliability Standards can be developed.[59] Accordingly, commenters state that the NERC GMD Task Force should be allowed to finish its work, which includes evaluating the need for GMD Reliability Standards, before the Commission directs NERC to develop Reliability Standards. Commenters also state that requiring operational procedures prematurely (e.g., before responsible entities have conducted GMD vulnerability assessments) may harm reliability because operational procedures can have unintended consequences that adversely affect the Bulk-Power System.[60]

34. Some commenters opposed to requiring operational procedures state that they could support the use of operational procedures under certain conditions. The Trade Associations state that they could support requiring operational procedures if the Commission determines that they are necessary.[61] Dominion states that it could support, as an interim step, having NERC gather current industry practices regarding GMD operational procedures and issue a best practices operating guideline within 90 days.[62] SPP Parties state that the Commission should encourage NERC to issue, before the next solar peak in June 2013, a ''reliability guideline'' to assist owners and operators of Bulk-Power System facilities to address GMD threats to the Bulk-Power System.[63]

[53] *See, e.g.,* NERC Comments at 9; Joint ISOs/RTOs Comments at 4; PJM Comments at 3; APS Comments at 3; Exelon Comments at 4; Bonneville Comments at 3; ITC Comments at 6; PPL Companies Comments at 2; Pa PUC Comments at 3; SCE Comments at 3–4; and IESO Comments at 6.

[54] *See, e.g.,* IESO Comments at 6; Exelon Comments 4–5.

[55] *See, e.g.,* Comments of Congressman Franks at 1–2; IESO Comments at 8–9; and EIS Comments at 5.

[56] NERC Comments at 9.

[57] ''K index'' is defined as ''a 3-hourly quasi-logarithmic local index of geomagnetic activity relative to an assumed quiet-day curve for the recording site. Range is from 0 (quiet) to 9 (severely disturbed).'' Space Weather Prediction Center, *Glossary of Solar-Terrestrial Terms, available at http://www.swpc.noaa.gov/info/glossary.html#k.*

[58] NERC Comments at 11.

[59] *See, e.g.,* Trade Associations Comments at 4–5; NARUC Comments at 5–6; ELCON Comments at 2; SPP Parties Comments at 3; CenterPoint Comments at 5; Dominion Comments at 4; Duke Comments at 2–3; and KCP&L Comments at 2.

[60] CenterPoint Comments at 7.

[61] Trade Associations Comments at 5–6 (''If the Commission finds it must direct NERC to develop a standard or standards to address the impact of GMDs on the [Bulk-Power System], the Trade Associations support the Commission's stage one proposal to require NERC to file one or more standards which would require grid owners and operators to develop and implement operations procedures that would mitigate GMD effects.'').

[62] Dominion Comments at 4.

[63] SPP Parties Comments at 4. As discussed below, the NERC GMD Task Force provided guidance to registered entities in the NERC Interim GMD Report by identifying possible operational procedures in response to GMD events. NERC Interim GMD Report at 80–81. In addition, NERC issued an Industry Advisory Alert on May 10, 2011 entitled ''Preparing for Geo-Magnetic Disturbances.'' NERC, Industry Advisory: Preparing

35. Commenters generally agree that operational procedures, if required, should be developed by responsible entities and not by NERC, although some commenters state that NERC could develop best practices to assist responsible entities.[64] Commenters state that the Reliability Standards should not have Requirements that treat responsible entities the same (''one-size-fits-all'') because responsible entities, due to geography, geology or other variables, may be more or less likely to experience the effects of GMDs. Commenters state that the operational procedures should be developed by responsible entities based on factors such as the entity's geographic location and the structural make-up of the entity's Bulk-Power System components. Commenters also state that operational procedures should not have the unintended effect of adversely impacting the Bulk-Power System. Commenters further state that the Reliability Standards should be clear as to which functional entities are responsible for compliance and that the assignment of responsibilities should be consistent with NERC's functional model.

Commission Determination

36. The Commission directs NERC to submit, within six months of the effective date of this Final Rule, one or more Reliability Standards requiring owners and operators of the Bulk-Power System to develop and implement operational procedures to mitigate the effects of GMDs consistent with the reliable operation of the Bulk-Power System. As we stated in the NOPR, ''operational procedures, while not a complete solution, constitute[] an important first step to addressing the GMD reliability gap because they can be implemented relatively quickly.'' [65] Operational procedures may help alleviate abnormal system conditions due to transformer absorption of reactive power during GMD events, helping to stabilize system voltage swings, and may potentially isolate some equipment from being damaged or misoperated.

37. It is not premature for NERC to begin developing Reliability Standards requiring owners and operators of the Bulk-Power System to develop and implement operational procedures. The comments reflect that some entities have implemented operational procedures to mitigate the impacts of GMDs.[66] In addition, the NERC Interim GMD Report identifies examples of operational procedures to mitigate GMD events including: reduction of equipment loading (e.g., by starting off-line generation), unloading the reactive load of operating generation, reductions of system voltage, and system and/or equipment isolation through reconfiguration of the transmission system.[67] In addition, the NERC GMD Task Force has developed operational procedure templates for certain functional entities. Given the work of the NERC GMD Task Force and recognizing that some operational procedures are already in place, we conclude that it is not premature for NERC to develop Reliability Standards that require operational procedures.

38. The Commission is not directing NERC to develop Reliability Standards that include specific operational procedures. Instead, as proposed in the NOPR, the Reliability Standards should include a mechanism that requires responsible entities to develop and implement operational procedures because owners and operators of the Bulk-Power System are most familiar with their own equipment and system configurations. In addition, we do not expect that owners and operators of the Bulk-Power System will necessarily develop and implement the same operational procedures. Instead, the Reliability Standards, rather than include ''one-size-fits-all'' Requirements, should allow responsible entities to tailor their operational procedures based on the responsible entity's assessment of entity-specific factors, such as geography, geology, and system topology, identified in the Reliability Standards. In addition, as we stated in the NOPR, the coordination of operational procedures across regions is an important issue that should be considered in the NERC standards development process.[68] The coordination of operational procedures across regions and data sharing might be overseen by planning coordinators or another functional entity with a wide-area perspective.[69] The NERC standards development process, as stated in the NOPR, should also consider operational procedures for restoring GMD-impacted portions of the Bulk-Power System that take into account the potential for damaged equipment that could be de-rated or out-of-service for an extended period of time.

39. While responsible entities will develop and implement operational procedures, NERC can support their efforts, for example, by identifying and sharing operational procedures found to be the most effective. NERC should also periodically survey the responsible entities' operational procedures, offer recommendations based on lessons-learned and new research findings, and re-evaluate whether modification to the Reliability Standards is warranted. Based on these surveys, NERC should produce periodic reports assessing the effectiveness of operational procedures. We take no position in this Final Rule on the content, frequency, or duration of such surveys, recommendations, or reports because we believe that those issues, in the first instance, should be addressed as part of the NERC standards development process.

40. We take no position in this Final Rule with respect to NERC's concerns regarding overreliance on the K-Index to trigger operational procedures. Technical issues regarding the development and implementation of operational procedures should be, in the first instance, considered in the NERC standards development process. Likewise, we take no position in this Final Rule on which functional entities should be responsible under the Reliability Standards because we believe that those issues, in the first instance, should be addressed as part of the NERC standards development process.

2. Schedule for Submitting and Implementing First Stage GMD Reliability Standards

NOPR

41. The NOPR proposed that NERC submit the First Stage GMD Reliability Standards to the Commission for

for Geo-Magnetic Disturbance (May 10, 2011), *available at http://www.nerc.com/fileUploads/File/Events%20Analysis/A-2011-05-10-01_GMD_FINAL.pdf.*

[64] NERC Comments at 6; AEP Comments at 4–5; ELCON Comments at 13; SPP Parties Comments at 5; IESO Comments at 11; Consumers Comments at 4; and Duke Comments at 5.

[65] NOPR, 141 FERC ¶ 61,045 at P 18 n.38 (citing NERC Interim GMD Report at 79 (''Operating procedures are the quickest way to put in place actions that can mitigate the adverse effects of GIC on system reliability . . . Both system operating and transmission owner organizations need to have appropriate procedures and training in place.'')).

[66] *See, e.g.,* IESO Comments at 5; Exelon Comments at 5; CEA Comments at 6–7; Dominion Comments at 5; Trade Associations Comments at 26.

[67] NERC Interim GMD Report at 80–81.

[68] NOPR, 141 FERC ¶ 61,045 at 20 (citing NERC Interim GMD Report at 79 (''The [operating] procedures of these organizations need to be coordinated with each other and with their neighboring organizations.'')).

[69] In NERC's May 21, 2012 post-Technical Conference comments, NERC stated that planning coordinators will conduct the wide-area analyses as part of the ''Initial Actions'' assessments, discussed below. NERC May 21, 2012 Comments at 9. LADWP proposes that reliability coordinators coordinate these efforts. LADWP Comments at 5.

approval within 90 days of the effective date of a final rule in this proceeding. The NOPR also proposed a suggested 90-day implementation period following Commission approval of the First Stage GMD Reliability Standards.

Comments

42. NERC states that ''[w]hile the implementation plan proposed for the completion of the first stage Reliability Standards is aggressive, NERC is committed to meeting whatever implementation targets are established by the Commission.'' [70] Other commenters support adoption of the proposed 90-day filing deadline for the First Stage GMD Reliability Standards.[71]

43. Other commenters state that the proposed 90-day deadline for filing the First Stage GMD Reliability Standards does not allow enough time to develop a Reliability Standard using the NERC standards development process.[72] ITC proposes a six-month deadline for developing and submitting the First Stage GMD Reliability Standards and a six-month implementation period following Commission approval. LADWP suggests an eight-month deadline for submitting the First Stage GMD Reliability Standards and a six-month implementation period. Joint ISOs/RTOs propose a one-year deadline for developing and submitting the First Stage GMD Reliability Standards, with the Commission directing NERC to develop an implementation schedule once NERC has a better idea of the degree of coordination that will be needed between the different functional entities. CenterPoint states that ''two years of study and review are needed to develop GMD Reliability Standards'' and proposes ''a region-based phased implementation schedule.'' [73] Exelon recommends having the ERO propose a filing deadline.[74] The Trade Associations recommend that the Commission not suggest an implementation period, but the Trade Associations state that it is their preliminary view that operational procedures could be implemented in six months.[75]

Commission Determination

44. We support the prompt development of mandatory and enforceable Reliability Standards that require owners and operators to implement operational procedures to afford some level of protection to the Bulk-Power System against GMD events. In its comments, NERC commits to meeting the 90-day deadline proposed in the NOPR. However, based on the concerns raised in other comments, we modify the schedule in the NOPR and direct NERC to submit proposed First Stage GMD Reliability Standards within six months of the effective date of this Final Rule.

45. While a six-month deadline may not be as long as some commenters propose, it strikes a balance by affording NERC a reasonable amount of time to develop the Reliability Standards and having Reliability Standards in place in the near term. As we stated in the NOPR, the Commission expects that NERC and owners and operators of the Bulk-Power System will draw on industry's experience with existing operational procedures to expedite the NERC standards development process. This should help establish the First Stage GMD Reliability Standards quickly to afford some level of protection to the Bulk-Power System against GMD events.

46. With respect to the suggested 90-day implementation period proposed in the NOPR, we modify the proposal and suggest a six-month implementation period. Given our expectation that the Reliability Standards proposed by NERC will require responsible entities to develop and implement operational procedures and to coordinate such efforts, it is appropriate to afford more time for implementation. We take no position in this Final R ule on the details of the implementation plan. The details of the implementation plan should be addressed, in the first instance, in the NERC standards development process.

C. ''Initial Actions'' GMD Vulnerability Assessments NOPR

47. The NOPR proposed to accept aspects of the ''Initial Actions'' detailed in NERC's May 21, 2012 post-Technical Conference comments. The NOPR stated that NERC proposed to ''identify facilities most at-risk from severe geomagnetic disturbance'' and ''conduct wide-area geomagnetic disturbance vulnerability assessment.'' [76] The NOPR agreed with NERC that critical Bulk-Power System facilities should be evaluated for GMD vulnerability and, as part of the ''Initial Actions,'' that special attention should be given to Bulk-Power System facilities that provide service to critical and priority loads.[77] The NOPR proposed that NERC would conduct these ''Initial Actions'' in parallel with the development and implementation of the First Stage GMD Reliability Standards.

Comments

48. NERC states that it agrees that an assessment is necessary to identify and classify the at-risk population of transformers, and NERC clarifies that asset owners will conduct the ''Initial Actions'' assessments. The Trade Associations agree that owners and operators of the Bulk-Power System should perform individual assessments, while planning authorities should perform system-wide assessments.

49. The Trade Associations support identification of at-risk facilities but caution that the assessment will require new tools, including improved modeling of GICs; improvements in area and regional power flow modeling; and benchmarking of models against actual GICs. Bonneville also states that, while an assessment needs to be done, the tools and models required to perform such an assessment currently do not exist. Bonneville anticipates the availability of ''adequate tools for use in developing limited assessments of risk indexed against the magnitude of GIC flow through individual transformers and possibly even reactive demand under GIC condition by the end of 2013.'' [78]

50. Duke states that the ''Initial Actions'' assessments should identify critical Bulk-Power System facilities but that ''[e]xpanding the effort to include identification and protection for all critical and priority loads is too extensive an activity to be completed simultaneously with the first stage GMD Reliability Standards.'' [79] Exelon states that the NOPR defines critical facilities in a confusing manner because the NOPR references ''critical and priority'' loads, which Exelon states generally relate to the distribution system and not to specific Bulk-Power System facilities. Exelon states that NERC has set out a methodology for determining what equipment it considers critical and a methodology to identify ''at-risk'' equipment based on peer-reviewed research. Exelon recommends that NERC and responsible entities rely on their technical expertise to define what

[70] NERC Comments at 9.

[71] *See, e.g.,* SENS Comments at 4; Foundation Comments at 19.

[72] *See, e.g.,* ITC Comments at 3; LADWP Comments at 8–9; Joint ISOs/RTOs Comments at 14; Consumers Energy Comments at 2–3; AEP Comments at 4.

[73] CenterPoint Comments at 16–17.

[74] Exelon Comments at 14.

[75] Trade Associations Comments at 22.

[76] NERC May 21, 2012 Comments at 8–9.

[77] NOPR, 141 FERC ¶ 61,045 at P 22 (citing NERC, *Severe Impact Resilience: Considerations and Recommendations* at 26 (Accepted by NERC Board of Trustees on May 9, 2012), *available at http://www.nerc.com/docs/oc/sirtf/SIRTF_Final_May_9_2012-Board_Accepted.pdf.*).

[78] Bonneville Comments at 5.

[79] Duke Comments at 5–6.

is critical equipment. Exelon also states that the time frames in the NOPR for completing the ''Initial Actions'' assessments is unrealistic because Exelon believes that the NOPR proposed to require completion of the assessments 90 days after the Commission approves the First Stage GMD Reliability Standards.[80] CenterPoint states that vulnerability assessments should be made on a ''regional basis'' with the regions most vulnerable to GMDs assessed first.

Commission Determination

51. The Commission accepts the proposal in NERC's May 21, 2012 post-Technical Conference comments and directs NERC to ''identify facilities most at-risk from severe geomagnetic disturbance'' and ''conduct wide-area geomagnetic disturbance vulnerability assessment'' as well as give special attention to those Bulk-Power System facilities that provide service to critical and priority loads.[81] As noted in NERC's comments, owners and operators of the Bulk-Power System, as opposed to NERC, will perform the assessments and special attention will be given to evaluating critical transformers (e.g., step-up transformers at large generating facilities).[82] We agree with the Trade Associations that system-wide assessments could be conducted by planning authorities, or another functional entity with a wide-area perspective, in coordination with owners and operators of the Bulk-Power System.[83] NERC should oversee these efforts and provide responsible entities with a methodology for identifying ''at-risk'' Bulk-Power System components and ''critical and priority loads'' that need to be analyzed in the ''Initial Actions.''

52. Some commenters state that tools do not exist for conducting the ''Initial Actions'' assessments. As a result, the commenters assert that the schedule for completing the ''Initial Actions'' assessments is unrealistic because the commenters believe that the NOPR proposed to require the completion of such assessments by the filing date or implementation date of the First Stage GMD Reliability Standards. We clarify that the ''Initial Actions'' assessments do no need to be completed by the filing date or implementation date of the First Stage GMD Reliability Standards. The NOPR only proposed that the ''Initial Actions'' assessments should *begin* immediately (i.e., simultaneous with the development of the First Stage GMD Reliability Standards). Thus, the ''Initial Actions'' assessments provide a head start for analyzing the most at-risk and critical facilities before the Second Stage GMD Reliability Standards become effective and could be used to assist in performing the GMD vulnerability assessments required in the Second Stage GMD Reliability Standards. Further, to the extent that owners and operators of the Bulk-Power System have already begun to identify facilities most at-risk from severe GMD events, those assessments should help to inform the ''Initial Actions'' assessments required by this final rule.

53. In NERC's May 21, 2012 post Technical Conference comments, NERC stated that all of its proposed ''Initial Actions'' would take 18–24 months to complete.[84] The June 2012 GMD Task Force Phase 2 Scope and Project Plan estimated that ''improve[d] tools for industry planners to develop GMD mitigation strategies'' would be completed within 12–36 months, depending on the task, and ''improve[d] tools for system operators to manage GMD impacts'' would be completed within 12–24 months.[85] Adjusting the deadline for submission of the Second Stage GMD Reliability Standards to 18 months allows time to identify facilities most at-risk from severe geomagnetic disturbance and to conduct wide-area geomagnetic disturbance vulnerability assessment, with special attention being given to those Bulk-Power System facilities that provide service to critical and priority loads, before the effective date of the Second Stage GMD Reliability Standards.[86]

D. Second Stage GMD Reliability Standards

54. As discussed below, the Commission adopts the NOPR proposal, with modifications, to direct NERC to submit Second Stage GMD Reliability Standards. We direct NERC to submit for approval, one or more Reliability Standards that require owners and operators of the Bulk-Power System to conduct initial and on-going assessments of the potential impact of benchmark GMD events on Bulk-Power System equipment and the Bulk-Power System as a whole. The Second Stage GMD Reliability Standard must identify what severity GMD events (i.e., benchmark GMD events) that responsible entities will have to assess for potential impacts on the Bulk-Power System. If the assessments identify potential impacts from benchmark GMD events, owners and operators must develop and implement a plan to protect against instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, as a result of a benchmark GMD event. Owners and operators of the Bulk-Power System cannot limit their plans to considering operational procedures or enhanced training alone, but must, subject to the vulnerabilities identified in the assessments, contain strategies for protecting against the potential impact of the benchmark GMD events based on factors such as the age, condition, technical specifications, system configuration, or location of specific equipment. These strategies could, for example, include automatically blocking GICs from entering the Bulk-Power System, instituting specification requirements for new equipment, inventory management, and isolating certain equipment that is not cost effective to retrofit, or a combination thereof. These Reliability Standards should be submitted within 18 months of the effective date of this Final Rule.

55. In the discussion below, we address the comments on the GMD vulnerability assessments, the plans for addressing identified vulnerabilities, and the schedule for submitting and implementing the Second Stage GMD Reliability Standards.

1. GMD Vulnerability Assessments

NOPR

56. The NOPR proposed to direct NERC to file one or more Reliability

[80] Exelon Comments at 7 n.20.

[81] NERC Comments at 8–9 (''As the first step in identifying the risk of geomagnetic disturbance to the bulk power system, NERC intends to complete a system-wide vulnerability assessment . . . special attention will be given to the evaluation of critical transformers, such as generator step-up units at large generating facilities . . . a high level review will be conducted to identify and classify the at-risk population based on existing peer-reviewed research. This assessment will be based on a high level screening approach that will include transformer design, condition, geology and geomagnetic location.'').

[82] The NERC Rules of Procedure permit NERC to seek such information from registered entities. NERC Rules of Procedures, Section 1601 (effective January 31, 2012) (''Within the United States, NERC and Regional Entities may request data or information that is necessary to meet their obligations under Section 215 of the Federal Power Act, as authorized by Section 39.2(d) of the Commission's regulations, 18 C.F.R. § 39.2(d).'').

[83] The accuracy of wide-area assessments will depend on the data provided by owners and operators of the Bulk-Power System.

[84] NERC May 21, 2012 Comments at 8.

[85] NERC, GMD Task Force Phase 2 Scope and Project Plan (June 2012), *available at http://www.nerc.com/docs/pc/gmdtf/GMD_Phase_2_Project_Plan_APPROVED.pdf.*

[86] The rulemaking following submission of the Second Stage GMD Reliability Standards 18 months from the effective date of this Final Rule is likely to take several months, and a multi-phased implementation period is likely to follow the effective date of a final rule approving the Second Stage GMD Reliability Standards.

Standards that require owners and operators of the Bulk-Power System to conduct initial and on-going assessments of the potential impact of GMDs on Bulk-Power System equipment and the Bulk-Power System as a whole. The NOPR stated that the Reliability Standards would require owners and operators to develop and implement plans based on the needs identified in the assessments.

57. The NOPR proposed to direct the ERO to consider the following parameters as it develops the Second Stage GMD Reliability Standards.

58. First, the Commission proposed that the Reliability Standards should contain uniform evaluation criteria for owners and operators to follow when conducting their assessments.

59. Second, the NOPR stated that the assessments should, through studies and simulations, evaluate the primary and secondary effects of GICs on Bulk-Power System transformers, including the effects of GICs originating from and passing to other regions.[87]

60. Third, the NOPR asserted that the assessments should evaluate the effects of GICs on other Bulk-Power System equipment, system operations, and system stability, including the anticipated loss of critical or vulnerable devices or elements resulting from GIC-related issues.[88]

61. Fourth, in conjunction with assessments by owners and operators of their own Bulk-Power System components, the Commission stated that wide-area or Regional assessments of GIC impacts should be performed. The NOPR noted that a severe GMD event can cause simultaneous stresses at multiple locations on the Bulk-Power System, potentially resulting in a multiple-outage event.[89] In predicting GIC flows, it is necessary to take into consideration the network topology as an integrated whole (i.e., on a wide-area basis).[90]

62. Fifth, the NOPR proposed that the assessments should be periodically updated, taking into account new facilities, modifications to existing facilities, and new information, including new research on GMDs, to determine whether there are resulting changes in GMD impacts that require modifications to Bulk-Power System mitigation schemes.

Comments

63. NERC and several commenters generally support requiring GMD vulnerability assessments.[91] NERC states that it supports the NOPR's approach of requiring owners and operators of the Bulk-Power System to conduct vulnerability assessments to determine how critical or vulnerable Bulk-Power System components react to simulated GICs of varying intensities. NERC also states that it appreciates the NOPR's recognition of the need to incorporate new information and research given that the science of GMDs is still evolving.

64. Many commenters that oppose the Second Stage GMD Reliability Standards at this time state that available methods of performing vulnerability assessments are crude and unrefined.[92] For example, the Trade Associations state that using existing tools ''would be asking industry to make assessments . . . and apply solutions at a point when these tools are incapable of doing so without creating risks to reliability that could be greater than any known risk resulting from a severe GMD event.'' [93] Commenters state that assessments should only be required after the necessary tools and methodologies have been developed and validated and the NERC GMD Task Force has completed its work.

65. Some commenters state that requiring all owners and operators to base their vulnerability assessments on uniform evaluation criteria would not be realistic due to the widely varying geology and geomagnetic latitudes within which the Bulk-Power System is planned and operated.

66. Some commenters state that the Commission should specify the severity of the GMD to assess and plan, although the commenters do not agree on a specific severity.[94] ITC states that it ''believes that there should be a clear engineering benchmark for transmission owner and operators to plan for GMD in a prudent fashion (e.g., a 1 in 100 year GMD event).'' [95] EIS states that, because the science of GMDs is inexact, an event twice as large as the largest expected GMD should be used as a safety margin.[96] Other commenters state that establishing a benchmark GMD event is problematic because there is no consensus storm scenario.

Commission Determination

67. We direct NERC, within 18 months of the effective date of this final rule, to submit for approval one or more Reliability Standards that require owners and operators of the Bulk-Power System to conduct initial and on-going vulnerability assessments of the potential impact of benchmark GMD events on Bulk-Power System equipment and the Bulk-Power System as a whole. We agree with commenters that the Second Stage GMD Reliability Standards should specify what severity GMD events (i.e., benchmark GMD events) responsible entities must assess for potential impacts on the Bulk-Power System. However, the Commission declines to specify the severity of the storm or otherwise define the characteristics of these benchmark GMD events in this Final Rule. Rather, NERC, through its standards development process, should identify the benchmark GMD events that responsible entities would have to assess.[97] Each responsible entity under the Second Stage GMD Reliability Standards would then be required to assess its vulnerability to the benchmark GMD events consistent with the five assessment parameters identified in the NOPR and adopted in this Final Rule.[98] The NERC standards development process should consider tasking planning coordinators, or another functional entity with a wide-area perspective, to coordinate assessments across Regions under the Second Stage GMD Reliability Standards to ensure consistency and regional effectiveness.

68. The comments that oppose requiring assessments stress that there is a substantial amount of work being done by the NERC GMD Task Force and industry to develop and validate tools, models, and data to perform the vulnerability assessments. We recognize that the tools for assessing GMD vulnerabilities are not fully mature. To address this concern, NERC should

[87] The NOPR described damage to Bulk-Power System components as a primary effect of GICs and production of harmonics that are not present during normal Bulk-Power System operation and increased transformer absorption of reactive power as secondary effects of GICs. NOPR, 141 FERC ¶ 61,045 at P 13.

[88] The Oak Ridge Study assessment included GMD modeling, simulation and review of storm impacts, power grid GIC flows and reactive power demands, transformer heating and risk of potential damage to transformers. *See generally Oak Ridge Study 319 Report.*

[89] *Oak Ridge Study 319 Report* at pages A1–1, A1–2.

[90] *Id.* at page 1–17.

[91] *See, e.g.,* NERC Comments at 14 Joint ISOs/RTOs Comments at 19; PJM Comments at 3; Pa PUC Comments at 3–4; AEP Comments at 2.

[92] *See, e.g.,* Trade Associations Comments at 30; Exelon Comments at 8.

[93] Trade Associations Comments at 4.

[94] *See, e.g.,* CEA Comments at 4–5; ITC Comments at 4.

[95] ITC Comments at 4.

[96] EIS Comments at 4.

[97] Similar work is already being done in Phase 2 of the NERC GMD Task Force Plan. The GMD Task Force Phase 2 Scope and Project Plan states that the NERC GMD Task Force will ''refine and improve a set of defined reference storms (most severe occurrence in a 100-year time horizon) and support ongoing research to identify the maximum theoretical GMD.'' GMD Task Force Phase 2 Scope and Project Plan at 5.

[98] NOPR, 141 FERC ¶ 61,045 at PP 28–32.

consider developing Reliability Standards that can incorporate improvements in the scientific understanding of GMDs. When developing the Second Stage GMD Reliability Standards implementation schedule, NERC should consider the availability of validated tools, models, and data necessary to comply with the Requirements.

69. Some tools currently exist and others are expected to be available when the Second Stage GMD Reliability Standards become effective. For example, NERC states in its comments that, while only one component of developing a comprehensive understanding of the effects of GMDs on the Bulk-Power System, NERC and the Electric Power Research Institute have developed a vulnerability assessment tool that calculates expected GIC levels and has released the tool in an open-source code.[99] In addition, NERC stated in its May 12, 2012 post-Technical Conference comments that NERC expects to complete several ''Mid-Term Actions'' within 12 to 36 months relating to the development of GMD assessment tools. These ''Mid-Term Actions'' include: (1) Refining probabilistic geomagnetic disturbance storm scenarios; (2) performing comprehensive tests of transformers to GIC; (3) increasing GIC monitoring locations across North America; and (4) developing analytical tools for system planners and operators to reliably manage geomagnetic disturbance impacts.[100] The 18-month deadline to submit the Second Stage GMD Reliability Standards (i.e., early-2015) falls within NERC's 12 to 36 month window for completion of the ''Mid-Term Actions.'' Moreover, it is likely that the implementation date of the Second Stage GMD Reliability Standards will be after the completion of the ''Mid-Term Actions.'' As a result, responsible entities will likely have additional tools available to conduct GMD vulnerability assessments once the Second Stage GMD Reliability Standards become effective. In any event, as we explain above, NERC should consider the availability of validated tools, models, and data as it develops an implementation schedule for the Second Stage GMD Reliability Standards.

70. In response to commenters who note that entities may have different vulnerabilities to GMD events based on their geographic location and geology, we emphasize that the vulnerability assessments in the Second Stage GMD Reliability Standards should not assume that all owners and operators of the Bulk-Power System are the same. However, we disagree with commenters that it is not realistic to base vulnerability assessments on uniform evaluation criteria.[101] We clarify that the NOPR did not intend to require responsible entities to use uniform values when assessing their GMD vulnerabilities. Instead, the vulnerability assessments would be based on uniform criteria (e.g., geographic location and geology) but the values for such criteria would be entity-specific.

71. In drafting the Second Stage GMD Reliability Standards, NERC should identify what severity GMD events (i.e., benchmark GMD events) responsible entities will have to assess, and NERC should technically support its choice. The benchmark GMD events should be based on factors that may include, but are not limited to, varying severity of the GMD (i.e., the rate of change in the GMDs magnetic fields), duration, geographic footprint of the GMD, how the GMD's intensity varies with latitude, system configuration, and the orientation of the magnetic fields produced by the GMD.[102] We recognize that there is currently no consensus on benchmark GMD events, and the Commission does not identify specific benchmark GMD events for NERC to adopt. Instead, this issue should be considered in the NERC standards development process so that any benchmark GMD events proposed by NERC have a strong technical basis.

2. Plans To Address Identified GMD Vulnerabilities NOPR

72. The NOPR proposed to direct the ERO to develop Reliability Standards that require owners and operators of the Bulk-Power System to develop and implement a plan, based on the results of the GMD vulnerability assessments, so that instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, will not occur as a result of a GMD. The NOPR did not propose to require a particular solution in the Second Stage GMD Reliability Standards to address identified vulnerabilities. However, the NOPR stated that it expected that some assessments will demonstrate that automatic blocking is necessary in some instances.

73. The NOPR stated that automatic blocking measures address the two major concerns with relying exclusively on operational procedures to mitigate GMDs (i.e., the short period of time to react to a GMD event and operational procedures may not prevent damage to Bulk-Power System equipment). The NOPR stated that automatic blocking can prevent the flow of GICs through power transformers and the Bulk-Power System.[103] The NOPR further stated that eliminating GICs in transformers prevents transformer core saturation and, thus, mitigates or prevents the effects of GMDs on the Bulk-Power System (i.e., transformer overheating, reactive power absorption, and harmonic generation). The NOPR did not propose to direct the ERO to require a particular automatic blocking technology, where blocking is deemed necessary. Instead, the Commission proposed to direct the ERO to identify in the Reliability Standards what would constitute appropriate automatic blocking measures. In defining what is an appropriate blocking measure, the NOPR stated that the ERO should address: (1) Its feasibility and effectiveness; and (2) its ability to operate without adversely impacting the reliable operation of the Bulk-Power System. The NOPR also proposed that the Reliability Standards should include a means by which the ERO can verify that selected blocking measures are appropriate.

74. The NOPR stated that, while not a means for blocking GICs, another possible option is to improve the ''withstand'' capability of Bulk-Power System components, which refers to a component's ability to withstand stresses imposed by GICs before suffering damage.[104] The NOPR stated that the ERO should consider whether the reliability goals of the proposed Reliability Standards can be achieved by a combination of automatic protection measures, including, for example, some combination of automatic blocking and improved ''withstand'' capability.

[99] NERC Comments at 13. As noted at the April 30, 2012 Technical Conference, John Kappenman stated that his investigations are based on mathematical models regarding the impacts of GMDs on the Bulk-Power System. *See, e.g.,* April 30, 2012 Prepared Testimony of John G. Kappenman at 1.

[100] NERC May 12, 2012 Comments at 10–12.

[101] NOPR, 141 FERC ¶ 61,045 at P 27.

[102] NERC Interim GMD Report at 82 (''The first step is to develop a handful of scenarios and the associated probability of each (e.g., severe storm—once in 100 years; serious storm once in 10 years).''). The Commission recognizes that this is not an exhaustive list and additional factors may be added as new information becomes available.

[103] NOPR, 141 FERC ¶ 61,045 at P 34 (citing NERC Interim GMD Report at 73).

[104] NOPR, 141 FERC ¶ 61,045 at P 36 (citing NERC Interim GMD Report at 67).

Comments

75. NERC states that the Second Stage GMD Reliability Standards should be technology-neutral and should not require dedicated blocking devices or other specific equipment. NERC further states that it is currently unable to verify whether a specific blocking device is appropriate.

76. A majority of commenters state that blocking devices need further study and that the Commission should clarify that the Second Stage GMD Reliability Standards will not require responsible entities to install blocking devices or require installation of any particular type of mitigation.[105] Bonneville, for example, states that the ''capability to perform studies that include transformer thermal models needed for developing appropriate mitigation plans and blocking strategies will likely not be available for use until the end of the 2014 at the earliest.'' [106] Commenters also express concern with the statement in the NOPR that plans for addressing GMD vulnerabilities cannot be limited to operational procedures or enhanced training alone because the commenters understand this language to require the installation of automatic blocking devices. PJM requests that the Reliability Standards explicitly state that equipment owners, not system operators, are the responsible entities.[107]

77. Some commenters state that the Second Stage GMD Reliability Standard should not require responsible entities to implement a plan that prevents cascading failures but instead support a Reliability Standard that allows NERC to determine the appropriate mix between prevention and timely restoration of the Bulk-Power System. Commenters also express concern with the language in the NOPR that, under the Second Stage GMD Reliability Standards, responsible entities would be required to ''develop and implement a plan so that instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, will not occur as a result of a GMD.'' Commenters state that such a standard imposes strict liability on responsible entities and is inconsistent with the unpredictable and uncontrolled nature of GMD events.

78. Other commenters express support for hardening elements of the Bulk-Power System as an option to protect against GMD events.[108] Some of these commenters state that operational procedures alone do not prevent the flow of GICs through Bulk-Power System elements; instead, operational procedures are intended to prevent the Bulk-Power System from collapsing, which exposes equipment to GICs for longer periods. EIS states that a combination of operational procedures and hardware is needed to protect the Bulk-Power System. Foundation states that relying on operational procedures alone, based on warnings from space weather observations, renders the Advanced Composition Explorer satellite, which gives details about an approaching GMD, a single point of failure in protecting the Bulk-Power System. Commenters also state that the benefits afforded by operational procedures are unpredictable because the state of the Bulk-Power System (e.g., load, available generation, unplanned equipment outages) at the time of a GMD event cannot be known in advance.

Commission Determination

79. We direct NERC, within 18 months of the effective date of this Final Rule, to submit for approval one or more Reliability Standards that, assuming the assessments identify potential impacts from a benchmark GMD event, require owners and operators of the Bulk-Power System to develop and implement a plan to protect against instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, as a result of a benchmark GMD event. Owners and operators of the Bulk-Power System cannot limit their plans to considering operational procedures or enhanced training, but must, subject to the vulnerabilities identified in the assessments, contain strategies for protecting against the potential impact of any benchmark GMD event based on factors such as the age, condition, technical specifications, system configuration, or location of specific equipment. These strategies could, for example, include automatically blocking GICs from entering the Bulk-Power System, instituting specification requirements for new equipment, inventory management, and isolating certain equipment that is not cost effective to retrofit, or a combination thereof.

80. A major concern raised in the comments is that the NOPR proposed to require responsible entities to utilize automatic blocking devices. However, the NOPR explicitly stated that it did not propose to require a particular solution in the Second Stage GMD Reliability Standards to address GMD vulnerabilities. The NOPR only stated that it expected that some assessments will demonstrate that automatic blocking is necessary in some instances. While the NOPR proposed to provide guidance with respect to the use and evaluation of automatic blocking devices, the NOPR did not propose to require the use of automatic blocking devices.

81. In this Final Rule, we do not direct the ERO to develop Reliability Standards that require the use of automatic blocking devices or any specific technology. We agree with NERC that the Reliability Standards should be technology-neutral.[109] Instead, the Second Stage GMD Reliability Standards should require owners and operators of the Bulk-Power System to develop and implement a plan to protect against instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, as a result of a benchmark GMD event. In the NOPR, we identified a non-exhaustive list of possible automatic measures for doing so, including automatically blocking GICs from entering the Bulk-Power System, instituting specification requirements for new equipment, inventory management, and isolating certain equipment that is not cost effective to retrofit.

82. As with the First Stage GMD Reliability Standards, the responsible entities should perform vulnerability assessments of their own systems and develop the plans for mitigating any identified vulnerabilities. We take no position in this Final Rule on which functional entities should be responsible for compliance under the Second Stage GMD Reliability Standards. However, the NERC standards development process should consider tasking planning coordinators, or another functional entity with a wide-area perspective, to coordinate mitigation plans across Regions under the Second Stage GMD Reliability Standards to ensure consistency and regional effectiveness. We clarify that if a responsible entity performs the required GMD vulnerability assessments and finds no potential GMD impacts, no

[105] *See, e.g.,* Trade Associations Comments at 32; Joint ISOs/RTOs Comments at 18; Bonneville Comments at 7; Exelon Comments at 11–12.

[106] Bonneville Comments at 6.

[107] PJM Comments at 4–5.

[108] *See, e.g.,* Pa PUC Comments at 4; Bonneville Comments at 7.

[109] NERC Comments at 4.

plan is required under the Second Stage GMD Reliability Standards.[110]

83. The NOPR stated that if a responsible entity identifies GMD vulnerabilities, then the plan cannot be limited to operational procedures or enhanced training alone. Some commenters interpreted this to mean that a responsible entity could never rely on operational procedures alone. We clarify that if the GMD vulnerability assessments in the Second Stage GMD Reliability Standards identify potential GMD impacts, while the development of the required mitigation plan cannot be limited to considering operational procedures or enhanced training alone, operational procedures and enhanced training may be sufficient if that is verified by the vulnerability assessments.

84. The Second Stage GMD Reliability Standards should not impose ''strict liability'' on responsible entities for failure to ensure the reliable operation of the Bulk-Power System in the face of a GMD event of unforeseen severity, as some commenters fear. The NOPR proposed to require owners and operators to develop and implement a plan so that instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, will not occur as a result of a GMD.[111] While this language is taken directly from the definition of ''reliable operation'' in FPA section 215(a)(4), and similar language is found in the Requirements of other Reliability Standards, we clarify that owners and operators should be required to develop and implement a plan to protect against instability, uncontrolled separation, or cascading failures of the Bulk-Power System, caused by damage to critical or vulnerable Bulk-Power System equipment, or otherwise, as a result of a benchmark GMD event. The goal of the NERC standards development process should be to propose Reliability Standards that ensure the reliable operation of the Bulk-Power System in response to identified benchmark GMD events.[112] Identifying robust and technically justified benchmark GMD events in the Reliability Standards, that the Bulk-Power System is required to withstand (i.e., continue ''reliable operation''), addresses the concern that responsible entities might otherwise be required to prevent instability, uncontrolled separation, or cascading failures of the Bulk-Power System when confronted with GMD events of unforeseen severity. In addition, the Reliability Standards should include Requirements whose goal is to prevent instability, uncontrolled separation, or cascading failures of the Bulk-Power System when confronted with a benchmark GMD event. Given that the scientific understanding of GMDs is still evolving, we recognize that Reliability Standards cannot be expected to protect against all GMD-induced outages.

85. In the NOPR, we proposed to direct the ERO to identify what would constitute appropriate automatic blocking measures. The NOPR stated that, in defining what is an appropriate blocking measure, the ERO should address: (1) Feasibility and effectiveness; and (2) ability to operate without adversely impacting the reliable operation of the Bulk-Power System. The comments reflect that certain entities have implemented automatic blocking measures, but the comments also reflect concerns with the unintended effects of automatic blocking measures and the uncertainties surrounding automatic blocking measures.[113] We do not require the use of automatic blocking measures in the Second Stage GMD Reliability Standards. However, given that some responsible entities have or may choose automatic blocking measures, the NERC standards development process should consider how to verify that selected blocking measures are effective and consistent with the reliable operation of the Bulk-Power System.

86. The NOPR stated that another possible mitigation option is to improve the ''withstand'' capability of Bulk-Power System components. The NOPR stated that the ''withstand'' capability refers to a component's ability to withstand stresses imposed by GICs before suffering damage. While responsible entities will decide how to mitigate GMD vulnerabilities on their systems, the NERC standards development process should consider how the reliability goals of the proposed Reliability Standards can be achieved by a combination of automatic measures including, for example, some combination of blocking, improved ''withstand'' capability, instituting specification requirements for new equipment, inventory management, and isolating certain equipment that is not cost effective to retrofit. As with the First Stage GMD Reliability Standards, NERC can identify and disseminate to responsible entities the measures or the combination of measures adequate to maintain the reliable operation of the Bulk-Power System against the potential GMD impacts identified in the assessments.

3. Schedule for Submitting and Implementing Second Stage GMD Reliability Standards

NOPR

87. The NOPR proposed a six-month deadline to submit the Second Stage GMD Reliability Standards to the Commission. However, the NOPR did not propose to direct or suggest an implementation schedule for the Second Stage GMD Reliability Standards. Instead, the NOPR stated that the Reliability Standards would likely require an extended, multi-phase implementation period given the time needed to conduct the required assessments and the time and cost of installing any required automatic protection measures. The NOPR stated that it would be appropriate for the Second Stage GMD Reliability Standards to include an implementation schedule that requires owners and operators of the Bulk-Power System to prioritize implementation so that components considered vital to the reliable operation of the Bulk-Power System are protected in the earliest phase of the implementation plan.

Comments

88. NERC states that ''[w]hile the implementation proposed for the completion of the second stage Reliability Standards is aggressive, NERC is committed to meeting whatever implementation targets are established by the Commission in the final rule.'' [114] Other commenters support adoption of the proposed six-month filing deadline for the Second Stage GMD Reliability Standards.[115]

89. Some commenters, including those supporting the Second Stage GMD Reliability Standards, express concern with the six-month deadline proposed in the NOPR because six months does not allow enough time to address the complex issues raised by the proposed

[110] NOPR, 141 FERC ¶ 61,045 at P 16 n.37.

[111] 16 U.S.C. 824o(a)(4) (''The term 'reliable operation' means operating the elements of the bulk-power system within equipment and electric system thermal, voltage, and stability limits so that instability, uncontrolled separation, or cascading failures of such system will not occur as a result of a sudden disturbance, including a cybersecurity incident, or unanticipated failure of system elements.'').

[112] *See, e.g.,* Reliability Standard TOP–004–2, Requirement R2 (''Each Transmission Operator shall operate so that instability, uncontrolled separation, or cascading outages will not occur as a result of the most severe single contingency.'').

[113] CEA Comments at 10; Bonneville Comments at 7; Dominion Comments at 7; CenterPoint Comments at 12–13; Exelon Comments at 11–12.

[114] NERC Comments at 13.

[115] *See, e.g.,* Foundation Comments at 19.

Reliability Standards.[116] Joint ISOs/RTOs propose a one-year development and filing deadline.[117] Idaho Power proposes an 18-month deadline for submitting the Reliability Standards and a three-year, multi-phased implementation period.[118] Exelon recommends that NERC should propose a filing deadline.[119]

90. Commenters opposing the Second Stage GMD Reliability Standards state that the development of Second Stage GMD Reliability Standards should be delayed given the need for further research into GMDs and the continuing work of the NERC GMD Task Force.

Commission Determination

91. In its comments, NERC commits to meeting the six-month submission deadline proposed in the NOPR. However, based on the concerns raised in the comments, we modify the schedule in the NOPR and direct NERC to submit the proposed Second Stage GMD Reliability Standards within 18 months of the effective date of this Final Rule. While NERC should propose an implementation plan, we do not direct or suggest a specific implementation plan. As stated in the NOPR, in a proposed implementation plan, we expect that NERC will consider a multi-phased approach that requires owners and operators of the Bulk-Power System to prioritize implementation so that components considered vital to the reliable operation of the Bulk-Power System are protected first. We also expect, as discussed above, that the implementation plan will take into account the availability of validated tools, models, and data that are necessary for responsible entities to perform the required GMD vulnerability assessments.

III. Information Collection Statement

92. The Office of Management and Budget (OMB) regulations require approval of certain information collection requirements imposed by agency rules. Upon approval of a collection(s) of information, OMB will assign an OMB control number and an expiration date. Respondents subject to the filing requirements of an agency rule will not be penalized for failing to respond to these collections of information unless the collections of information display a valid OMB control number. The Paperwork Reduction Act (PRA) requires each federal agency to seek and obtain OMB approval before undertaking a collection of information directed to ten or more persons, or contained in a rule of general applicability.

93. The Commission is submitting these reporting requirements to OMB for its review and approval under section 3507(d) of the PRA. The Commission solicited comments on the Commission's need for this information, whether the information will have practical utility, ways to enhance the quality, utility, and clarity of the information to be collected, and any suggested methods for minimizing the respondent's burden, including the use of automated information techniques. The Commission received no comments on the burden and cost information contained in the NOPR.

94. The Public Reporting Burden and cost related to the proposed rule in Docket RM12–22–000 are covered by, and already included in, the existing FERC–725, Certification of Electric Reliability Organization; Procedures for Electric Reliability (OMB Control No. 1902–0225). FERC–725 includes the ERO's overall responsibility for developing Reliability Standards, such as the Reliability Standards for Geomagnetic Disturbances.

95. Internal review: The Commission has reviewed the proposed changes and has determined that the changes are necessary to ensure the reliability and integrity of the Nation's Bulk-Power System.

96. Interested persons may obtain information on the reporting requirements by contacting: Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426 [Attention: Ellen Brown, Office of the Executive Director, email: *DataClearance@ferc.gov,* Phone: (202) 502–8663, fax: (202) 273–0873]. Comments on the requirements of this rule may also be sent to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503 [Attention: Desk Officer for the Federal Energy Regulatory Commission]. For security reasons, comments should be sent by email to OMB at *oira_submission@omb.eop.gov.* Please reference OMB Control No. 1902–0225, FERC–725 and the docket number of this proposed rulemaking in your submission.

IV. Environmental Analysis

97. The Commission is required to prepare an Environmental Assessment or an Environmental Impact Statement for any action that may have a significant adverse effect on the human environment.[120] The Commission has categorically excluded certain actions from this requirement as not having a significant effect on the human environment. Included in the exclusion are rules that are clarifying, corrective, or procedural or that do not substantially change the effect of the regulations being amended.[121] The actions proposed here fall within this categorical exclusion in the Commission's regulations.[122]

V. Regulatory Flexibility Act

98. The Regulatory Flexibility Act of 1980 (RFA)[123] generally requires a description and analysis of proposed rules that will have significant economic impact on a substantial number of small entities. The RFA mandates consideration of regulatory alternatives that accomplish the stated objectives of a proposed rule and that minimize any significant economic impact on a substantial number of small entities. The Small Business Administration's (SBA) Office of Size Standards develops the numerical definition of a small business.[124] The SBA has established a size standard for electric utilities, stating that a firm is small if, including its affiliates, it is primarily engaged in the transmission, generation and/or distribution of electric energy for sale and its total electric output for the preceding twelve months did not exceed four million megawatt hours.[125]

99. The NOPR stated that, by proposing only to direct NERC, the Commission-certified ERO, to develop GMD Reliability Standards, the proposal would not have a significant or substantial impact on entities other than NERC. The NOPR stated that the ERO develops and files with the Commission for approval Reliability Standards affecting the Bulk-Power System, which represents: (a) a total electricity demand of 830 gigawatts (830,000 megawatts) and (b) more than $1 trillion worth of assets. Therefore, the NOPR certified

[116] *See, e.g.,* LADWP Comments at 5; Joint ISOs/RTOs Comments 24–25.

[117] Joint ISOs/RTOs Comments at 24.

[118] Idaho Power Comments at 2.

[119] Exelon Comments at 14.

[120] *Regulations Implementing the National Environmental Policy Act of 1969,* Order No 486, 52 FR 47897 (Dec. 17, 1987), FERC Stats. & Regs. Preambles 1986–1990 ¶ 30,783 (1987).

[121] 18 CFR 380.4(a)(2)(ii).

[122] Only one commenter, SENS, addressed the NOPR's Environmental Analysis proposal. SENS requested that the Commission ''include an environmental impact assessment of GMD-induced power outage on the approximately 104 nuclear power plants in the United States *if the proposed rules are not enacted.*'' SENS Comments at 5 (emphasis in original). The request in this comment is moot in light of the Commission's directive in this Final Rule that the ERO develop and submit for approval proposed GMD Reliability Standards.

[123] 5 U.S.C. 601–612.

[124] 13 CFR 121.101.

[125] 13 CFR 121.201, Sector 22, Utilities & n.1.

that the proposal will not have a significant economic impact on a substantial number of small entities. The NOPR further stated that any Reliability Standards proposed by NERC in compliance with this rulemaking will be considered by the Commission in future proceedings and that, as part of any future proceedings, the Commission will make determinations pertaining to the Regulatory Flexibility Act based on the content of the Reliability Standards proposed by NERC.

100. The Commission received one comment addressing the Regulatory Flexibility Act certification in the NOPR.

Comments

101. APPA, NRECA, and TAPS state that the GMD Reliability Standards could result in significant adverse regulatory impacts on many small utilities. APPA, NRECA and TAPS state that, while it might be premature for the Commission to engage in a full RFA analysis at this stage, putting off an RFA analysis will make it more difficult to perform an analysis in the future. APPA, NRECA and TAPS state that the Commission should at least gather the necessary facts in the comment phase of this rulemaking so that it can develop a record on the universe of small entities that could be affected by NERC Reliability Standards addressing GMDs and possible ways to mitigate any adverse impacts of such Reliability Standards. APPA, NRECA and TAPS encourage the Commission to host a ''technical conference, convene[] a panel of small utility representatives, or undertake some other comparable outreach effort to solicit information from the small entities that may be affected by the contemplated GMD reliability standards.'' [126]

Commission Determination

102. The Commission certifies that this final rule will not have a significant economic impact on a substantial number of small entities. We affirm the reasoning in the NOPR that, in only directing the ERO to develop and submit for approval GMD Reliability Standards, this Final Rule only applies to NERC, which, as discussed above, is not a small entity. APPA, NRECA and TAPS concede that it would be premature to conduct a full Regulatory Flexibility Analysis at this time, but they state that it could be more difficult to conduct such an analysis in the future. We disagree because the Commission cannot assess the economic impact on small entities of the GMD Reliability Standards at this time since they have not been developed or submitted for approval by NERC. Such an analysis, at this time, would be purely speculative. As we stated in the NOPR, the GMD Reliability Standards proposed by NERC in compliance with this Final Rule will be considered by the Commission in future rulemakings. As part of those rulemakings, the Commission will make determinations pertaining to the Regulatory Flexibility Act based on the content of the Reliability Standards proposed by NERC. While the Commission declines to conduct the types of outreach suggested by APPA, NRECA, and TAPS at this time, APPA, NRECA and TAPS should participate in the standards development process as NERC develops the Reliability Standards required by this Final Rule to ensure that their views are taken into account. In addition, the Commission welcomes any informal discussions on these issues as NERC develops the Reliability Standards required by this final rule.

VI. Document Availability

103. In addition to publishing the full text of this document in the **Federal Register**, the Commission provides all interested persons an opportunity to view and/or print the contents of this document via the Internet through the Commission's Home Page (*http://www.ferc.gov*) and in the Commission's Public Reference Room during normal business hours (8:30 a.m. to 5:00 p.m. Eastern time) at 888 First Street NE., Room 2A, Washington, DC 20426.

104. From the Commission's Home Page on the Internet, this information is available on eLibrary. The full text of this document is available on eLibrary in PDF and Microsoft Word format for viewing, printing, and/or downloading. To access this document in eLibrary, type the docket number excluding the last three digits of this document in the docket number field.

105. User assistance is available for eLibrary and the Commission's Web site during normal business hours from the Commission's Online Support at (202) 502–6652 (toll free at 1–866–208–3676) or email at *ferconlinesupport@ferc.gov,* or the Public Reference Room at (202) 502–8371, TTY (202) 502–8659. Email the Public Reference Room at *public.referenceroom@ferc.gov.*

VII. Effective Date and Congressional Notification

106. These regulations are effective July 22, 2013. The Commission has determined, with the concurrence of the Administrator of the Office of Information and Regulatory Affairs of OMB, that this rule is not a ''major rule'' as defined in section 351 of the Small Business Regulatory Enforcement Fairness Act of 1996.

By the Commission.

Nathaniel J. Davis, Sr.,

Deputy Secretary.

Appendix—Commenters

Abbreviation	Commenter
Alcoa	Alcoa Inc. and Alcoa Power Generating Inc.
AFS	Advanced Fusion Systems.
AEP	American Electric Power Service Corporation.
APS	Arizona Public Service Company.
Ayers	Cynthia E. Ayers.
George Baker	George H. Baker III, Ph.D.
Joel Baker	Joel E. Baker.
Bequette	William Bequette.
Bowen	Dwane M. Bowen.
Boyd	David A. Boyd.
Bonneville	Bonneville Power Administration.
CEA	Canadian Electricity Association.
CenterPoint	CenterPoint Energy Houston Electric, LLC.
Clinic	Samuelson-Glushko Technology Law and Policy Clinic, University of Colorado Law School.
Congressman Franks	Congressman Trent Franks.

[126] APPA, NRECA, and TAPS Comments at 6.

Abbreviation	Commenter
Consumers Energy	Consumers Energy Company.
Dominion	Dominion Resources Services, Inc.
Duke	Duke Energy Corporation.
EEI	Edison Electric Institute.
EIS	Electric Infrastructure Security Council.
ELCON	Electricity Consumers Resource Council.
Emprimus	Emprimus LLC.
EPSA	Electric Power Supply Association.
Exelon	Exelon Corporation.
Foundation	Foundation for Resilient Societies.
FPL	Florida Power & Light Company.
Frauman	Roger Frauman.
Greenhill	John Greenhill.
Idaho Power	Idaho Power Company.
IESO	Independent Electricity Operator and Hydro One Networks, Inc.
ITC	International Transmission Company.
Joint ISOs/RTOs	Alberta Electric System Operator, California Independent System Operator, Electric Reliability Council of Texas, Independent Electricity System Operator of Ontario, Inc., ISO New England Inc., Midwest Independent Transmission System Operator, Inc., New York Independent System Operator, Inc., and Southwest Power Pool (SPP).
Johnson	Amanda Johnson.
Kappenman	John Kappenman, Storm Analysis Consultants.
KCP&L	Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company.
Koenig	Roger L. Koenig, Michigan State University.
Kristen	Steven F. Kristen.
LADWP	City of Los Angeles Department of Water and Power.
Leggett	Nickolaus Leggett.
Lloyd's	Lloyd's.
Lund	John Curtis Lund.
Manto	Charles L. Manto.
Mitsubishi Electric	Mitsubishi Electric Power Products, Inc.
NARUC	National Association of Regulatory Utility Commissioners.
NERC	North American Electric Reliability Corporation.
NV Energy	Nevada Power Company and Sierra Pacific Power Company.
Pa PUC	Pennsylvania Public Utility Commission.
Phoenix	Phoenix Electric Corp.
PJM	PJM Interconnection, L.L.C.
PPL Companies	Louisville Gas and Electric Company and Kentucky Utilities Company, Lower Mount Bethel Energy, LLC, PPL Brunner Island, LLC, PPL Electric Utilities Corporation, PPL EnergyPlus, LLC, PPL Ironwood, LLC, PPL Martins Creek, LLC, PPL Montana, LLC, PPL Montour, LLC, and PPL Susquehanna LLC.
Orquin	Alberto Ramirez Orquin, Ph.D.
Ruckriegle	Heidi Ruckriegle.
SCE	Southern California Edison.
SDG&E	San Diego Gas & Electric.
SENS	Stored Energy Systems LLC.
SmartSenseCom	SmartSenseCom, Inc.
SPP Parties	AEP, City of Coffeyville, Kansas, City of Independence, Missouri, Oklahoma Municipal Power Authority, SPP, Southwester Power Administration, Westar Energy, Inc., and Western Farmers Electric Cooperative.
Stolov	Jerome J. Stolov.
TAPS	Transmission Access Policy Study Group.
Trade Associations	American Public Power Association (APPA), Edison Electric Institute, Large Public Power Council, National Rural Electric Cooperative Association (NRECA).
Wallenmeyer	William Wallenmeyer.

[FR Doc. 2013–12141 Filed 5–22–13; 8:45 am]

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DEPARTMENT OF HOMELAND SECURITY

Coast Guard

33 CFR Part 165

[Docket No. USCG–2013–0163]

RIN 1625–AA00

Safety Zone; 2013 Fish Festival Fireworks, Lake Erie, Vermilion, OH

AGENCY: Coast Guard, DHS.

ACTION: Temporary final rule.

SUMMARY: The Coast Guard is establishing a temporary safety zone on Lake Erie, Vermilion, OH. This safety zone is intended to restrict vessels from a portion of Lake Erie during the 2013 Fish Festival Fireworks display. This temporary safety zone is necessary to protect spectators and vessels from the hazards associated with a fireworks display.

DATES: This rule is effective from 9:30 p.m. until 11 p.m. on June 14, 2013.

ADDRESSES: Documents mentioned in this preamble are part of docket [USCG–2013–0163]. To view documents